NOTES ON THE DISTRIBUTION AND ENDEMISM OF INDIAN *FIMBRISTYLIS*[1]

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(*With one text-figure*)

Key words: *Fimbristylis*, distribution, endemism, India

The genus *Fimbristylis* is widely distributed in the tropics and subtropics. About 200 species have been reported from all over the world. Of the 92 species found in India, 37 are endemic. Peninsular India has the maximum number of endemics in the country with 30 species, followed by the northeast with 5 species. In the case of other angiosperms also, the high degree of endemism is distinct in peninsular India. Majority of the non-endemic *Fimbristylis* are also found in peninsular India. Availability of suitable habitat may be the cause for this kind of distribution. In fact, many non-endemic species are also restricted to India and the neighbouring countries of South Asia.

Introduction

The genus *Fimbristylis* of the family Cyperaceae was founded by Vahl in 1806 by segregating the species from the genus *Scirpus* which have spiral glumes and flat, ciliate, distigmatic, deciduous style with enlarged base. He created another genus *Abildgaardia* for the species having the same kind of floral structure, but having distichous glumes, while the tristigmatic species were left in the genus *Scirpus*. But there are species which have spikelets with partly distichous and partly spiral glumes. Similarly often distigmatic and tristigmatic flowers are found in one and the same species, rarely even in the same spikelet. Hence arrangement of the glumes and the number of stigmas are not very good characters for delimiting these genera. Moreover, Robert Brown (1810) found the deciduous style articulated with the nut as most characteristic of the genus *Fimbristylis*. Based on this he included many tristigmatic species in the genus *Fimbristylis* which were treated under *Scirpus* till then.

Another genus *Trichelostylis* founded by Lestiboudois (1819) is based on the tristigmatic nature. But subsequent workers treated this as a synonym of *Fimbristylis*, though Nees tried to revive that genus. The genus *Bulbostylis* has been merged with *Fimbristylis* by Asa Grey, Bentham and Koyama, but there is a concrete morphological difference between these two genera. Embryological studies done by van der Vekan (1965) on the species of both these genera have also proved this point, though cytologically both are the same, having the same basic chromosome number and similar chromosome size.

Iria (L.C. Rich.) Hedwig. f. (1806). *Echinolytrum* Desv. (1808), *Pogonostylis* Bert. (1833), *Microspora* Boeck. (1860) and *Actinoschoenus* Benth. (1883) are the other names assigned to this genus earlier.

Fimbristylis is characterised by the absence of perianth bristles in the flower and also by the absence of persistent style base on the nut. These characters also differentiate it from the closely related genera *Eleocharis* and *Bulbostylis* respectively.

Kern (1974) treated this genus under the tribe Cypereae of subfamily Cyperoideae. But Koyama (1985) placed it under the tribe Fimbristylideae.

A majority of the species like *F. dichotoma, F. bisumbellata, F. complanata, F. tenera,* and *F. tetragona* etc. prefer habitats like swampy areas, margins of rice fields, river beds, banks of rivers and streams, margins of lakes and open moist waste places etc. Some of these are found along seashores and along back waters. A few of them grow in forests and savannahs also. The majority are low land

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species, but a few are found at high altitudes also. Species like *F. aestivalis* and *F. miliacea* are common weeds in wet rice fields.

Distribution

The genus *Fimbristylis* is widespread, especially in the tropics and subtropics. A few species are found in the warmer parts of the temperate region also. About 200 species have been reported from all over the world, of which the majority are concentrated in tropical Asia. So far, 92 species of *Fimbristylis* have been reported from India. A good number of varieties are also described due to the highly variable characters of many species like *F. dichotoma, F. falcata* and *F. aestivalis.*

Endemism

Of the 92 species reported so far 37 are endemic to India, while 5 varieties are reported to be endemic from the present political boundaries of India only. Within India, endemism in the species of *Fimbristylis* is more predominant in peninsular India. In the case of other angiosperms also the high degree of endemism is distinct in peninsular India and makes the flora of this part of the country unique. Turrill's (1964) contention that next to islands, the peninsular regions provide favourable conditions for endemism is true in the case of peninsular India also. Characteristic endemic species of the Western Ghats were enumerated by Subramanyam and Nayar (1974), who mentioned that Western Ghat summits are comparable with islands regarding endemic species. In general peninsular India has 32% of the endemics, while the rest of the country has only 27% (Nayar, 1980). According to Blasco (1971) there are 1,268 endemic dicotyledons in South India. Nayar (1980) has estimated a total of about 2,100 endemic species in peninsular India. Ahmedullah and Nayar (1987) have reported 29 species and one variety of *Fimbristylis* Hemadri is *nomen nudum* and hence should be rejected. *F. unispicularis* is endemic to peninsular India. Of this *F. junnarensis* Govind. and Hemadri is the correct name of this species. Similarly *F. ligulata* Govind. and *F. bisumbellata* var. *hirtistyla* Fisch. are synonyms of *F. merrillii* Kern and *F. squarrosa* var. *esquarrosa* Makino respectively, which are not endemic to India. Excluding these three taxa the actual number of endemics reported earlier from peninsular India is 27 species.

In the present study, of the 64 species reported so far, 30 species and 2 varieties were found to be endemic to this part of the country (see enumeration).

Next to peninsular India, the northeast has the maximum number of endemics, though the number is comparatively much less. There are only 5 species and one variety of *Fimbristylis* endemic to the northeast (see enumeration). Of this *F. hookeriana* Boeck. extends to Eastern India also. *F. multicephala* Govind. is the only species endemic to North India. *F. polytrichoides* var. *halophila* Kurz ex Clarke belong to southern as well as eastern India.

In the case of non-endemic species also, the majority of them can be found in peninsular India, followed by the northeast. As mentioned earlier, 64 species reported from peninsular India compromise more than 69% of the total number reported from the whole country. The high degree of species diversity in peninsular India and the northeast must be due to the availability of more wet and humid conditions in these parts of the country. It is evident that northeast and peninsular India, especially towards the coastal areas and Western Ghats experience more rain. Availability of wet habitats in the form of rivers, streams, ponds, lakes, lagoons, swamps, rice fields and other wetlands and also comparatively high atmospheric humidity must be the reason for the concentration of species in these parts. Moist or wet conditions are the most preferred by the majority of species. Even moist grasslands of high ranges, rocky slopes, mountain peaks and forest clearings in the Western Ghats are very good habitats for certain species like *F. consanguinea, F. falcata, F. narayanii, F. kingii,* and *F. semidisticha* etc. Species adapated to halophytic conditions like *F. polytrichoides* and *F. ferruginea* are found along the sea coast and near brackish waters.

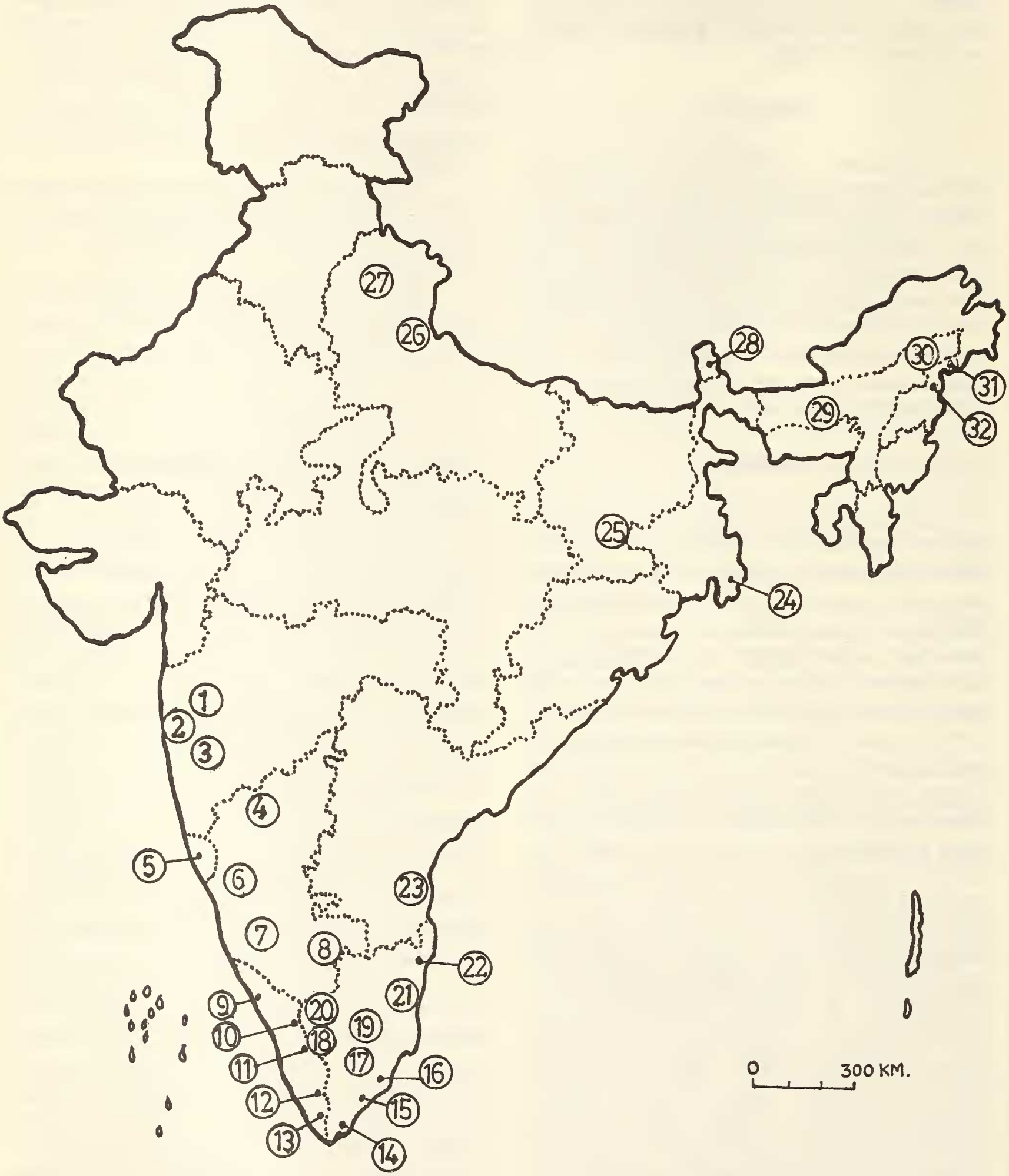

Fig. 1. Map showing the distribution of endemic *Fimbristylis*

INDIAN SPECIES EXTENDING TO SOUTH AND SOUTH-EAST ASIAN COUNTRIES

Many species found in India have world wide distribution. *F. dichotoma* (L). Vahl, *F. complanata* (Retz.) Link, *F. ferruginea* (L.) Vahl and *F. cymosa* R. Br. are a few examples. But several species and a few infra-specific taxa show an interesting range of distribution, being restricted to India and the neighbouring countries of South Asia and also extending to the southeast Asian region.

F. monticola Hochst. ex Steud., *F. pentaptera* (Nees) Kunth, *F. dichotoma* sp. *glauca* (Vahl) Koyama and *F. falcata* var. *abbreviata* (Boeck.) Karthik. are found in peninsular India and Sri Lanka only. *F. umbellaris* var. *vicaryi* (Clarke) Karthik, probably extends from North India to Pakistan, along the river Chenab. Similarly *F. intonsa* Blake, *F. merguensis* Clarke and *F. aestivalis* var. *trichopoda* Kern are found only in India and Malaysia. *F. multinervia* Govind. extends from the northeast to Myanmar. *F. disticha* Boeck. and *F. fimbristyloides* (F. V. Muell.) Druce, found in Andaman and Nicobar Islands and northeast India respectively, are also found in Myanmar, Thailand and China. *F. obtusata* (Clarke) Ridl., reported from eastern India, extends to Myanmar, Thailand and Malaysia. Similarly *F. sleumeri* Kern found in Thailand and Myanmar is also found in northeast India. *F. pierotii* Miq. occuring in east and northeast India is found in Malaysia, Korea, and Japan also. In India, *F. rigidula* Nees is distributed in the Himalayas, east and northeast India and also found in Nepal, southern China, Malaysia, Thailand and the Philippines. *F. fusca* (Nees) Clarke also extends from India to Nepal, Malaysia, Indochina and Thailand. In India *F. stolonifera* Clarke is restricted to central, east and northeast India, it is also reported from Nepal also. *F. umbellaris* (Lam.) Vahl found in north, east, northeast and Andaman and Nicobar Islands is also found in Nepal, Sri Lanka, Indo-China and Japan. *F. griffithii* Boeck. reported from northeast India and Andaman and Nicobar Islands is also found in Myanmar, Thailand, Malaysia and Indo-China. *F. eragrostis* (Nees & May. ex Nees) Hance extends from India to Sri Lanka, southern China, Malaysia and Indo-China. *F. merrillii* Kern reported recently from western peninsular India by Mistry and Almeida (1987) is found in China, Thailand, Queensland and Malaysia. There are some other varieties also showing this kind of distribution.

Species to be excluded

F. dura (Zoll. & Mor.) Merr. given by Clarke (1893) as *F. asperrima* Boeck. is not indicated from the present political boundaries of India but from Sri Lanka and Tavoy to Singapore. Hence, the presence of this species in India is doubtful, though it is included by Karthikeyan *et al* (1989) without actual locality.

ENUMERATION OF SPECIES AND INFRA-SPECIFIC TAXA ENDEMIC TO PENINSULAR INDIA

Taxa	Distribution shown in the map
Fimbristylis aggregata Fisch.	18
F. albicans Nees	Deccan (without exact locality)
F. amplocarpa Govind.	17
F. angamoozhiensis Ravi et Anil Kumar	12
F. arnottiana Boeck.	20
F. complanata var. *fenestrata* Clarke	Deccan (without exact locality)
F. contorta Fisch.	15
F. crystallina Govind.	18
F. dauciformis Govind.	11
F. dichotoma var. *nilgirica* (Clarke) Karthik.	20
F. eligulata Govind.	16, 22
F. kingii Clarke ex Boeck.	7, 8, 10, 20
F. latiglumifera Govind.	20
F. latinucifera Govind.	20
F. lawiana (Boeck.) Kern	2, 4, 6
F. longistigmata Govind.	14
F. monospicula Govind.	17, 19
F. narayanii Fisch. (also in NW Himalaya?)	15
F. paupercula Boeck.	15, 17, 20
F. pseudonarayanii Ravi et Anil Kumar	13
F. pustulosa Govind.	18

Taxa	Distribution shown in the map
F. rectifolia Govind.	20
F. rigidiuscula Govind.	17
F. rugosa Govind.	14, 17, 20
F. scabrisquama Govind.	17
F. semidisticha Govind.	17, 20
F. strigosa Govind.	16, 18
F. swamyii Govind.	9, 17
F. tortifolia Govind.	17
F. uliginosa Steud.	17, 18
F. unispicularis Govind.	1
F. woodrowii Clarke	3, 21

TAXA ENDEMIC TO NORTHEAST INDIA

Taxa	Distribution shown in the map
Fimbristylis carpopoda Govind,	31
F. circumciliata Govid.	30
F. filifolia Boeck	28
F. hookeriana Boeck.	25, 29 (Extending to E. India)
F. stolonifera var. *ludens* Clarke	29
F. yunnanensis Clarke	32

OTHER ENDEMIC TAXA WITH THEIR DISTRIBUTION

Taxa	Distribution	Ref. in the Map
F. fucinux Clarke	North, Northeast India	26, 28
F. multicephala Govind.	N. India	27
F. polytrichoides var. *halophila* Kurz ex Clarke	South & East India	23, 24

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